

Application No.: 10/028,978

Docket No.: 21994-00036-US

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer,

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens, and

~~whereby wherein the land section is wobbled in the radial direction as a result of being subjected to a method of phase modulation by a superimposed wave obtained by superimposing a single frequency wave having a frequency of integral multiples or one over integral multiples of a frequency of a phase modulated wave on the phase modulated wave.~~

2. (Previously Presented) The information recording medium in accordance with claim 1, wherein a record based on at least one of reflectivity difference and phase difference is performed onto either one of the groove and land sections.

3. (Original) The information recording medium in accordance with claim 1, wherein the wavelength λ is within a range of 350 to 450 nm and the numerical aperture NA is within a range of 0.75 to 0.9.

4. (Previously Presented) The information recording medium in accordance with claim 2, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that the modulated amplitude exceeds 0.4.

Application No.: 10/028,978

Docket No.: 21994-00036-US

5. (Previously Presented) The information recording medium in accordance with claim 2, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that the reflectivity exceeds 5 %.

6. (Original) The information recording medium in accordance with claim 1, wherein the recording layer is formed by a phase change material.

7. (Currently Amended) A reproducing apparatus for reproducing an information recording medium ~~at least comprising:~~:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating a groove and a land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens; and

wherein the land section is wobbled in the radial direction by a superimposed wave obtained by superimposing a single frequency wave having a frequency of integral multiples or one over integral multiples of a frequency of a phase modulated wave on the phase modulated wave;

the reproducing apparatus comprising:

Application No.: 10/028,978

Docket No.: 21994-00036-US

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling the drive of the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

demodulator means for demodulating an information signal read out by the pickup;

interface (I/F) means for transmitting a signal demodulated by the demodulator externally; and

controlling means for controlling the entire reproducing apparatus totally.

8. (Previously Presented) The reproducing apparatus in accordance with claim 7, the reproducing apparatus further comprising an auxiliary information demodulator for demodulating a differential signal outputted from the pickup.

9. (Currently Amended) A recording apparatus for recording an original information signal on an information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating a groove and a land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and wherein P is a

Application No.: 10/028,978

Docket No.: 21994-00036-US

pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens, and wherein the land section is wobbled in the radial direction ~~as a result of being subject to a method of phase modulation by a superimposed wave obtained by superimposing a single frequency wave having a frequency of integral multiples or one over integral multiples of a frequency of a phase modulated wave on the phase modulated wave,~~

the recording apparatus comprising:

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from and recording on the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling ~~to the drive of~~ the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

interface (I/F) means for receiving the original information signal to be recorded;

modulator means for modulating the original information signal;

waveform converter means for converting the original information signal into a format suitable for a recording characteristic of the recording layer of the information recording medium;

auxiliary information demodulator means for demodulating a differential signal outputted from the pickup; and

controlling means for controlling the entire recording apparatus.

Application No.: 10/028,978

Docket No.: 21994-00036-US

10. (Currently Amended) An information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer,

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens, and

wherein scattering of the thickness of the light transmission layer is within a range of ± 0.002 mm over the entire light transmission layer.

11. (Previously Presented) The information recording medium in accordance with claim 10, wherein a record based on at least one of reflectivity difference and phase difference is performed onto either one of the groove section and the land section.

12. (Previously Presented) The information recording medium in accordance with claim 10, wherein the wavelength λ is within a range of 350 to 450 nm and the numerical aperture NA is within a range of 0.75 to 0.9.

13. (Previously Presented) The information recording medium in accordance with claim 11, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that the modulated amplitude exceeds 0.4.

14. (Previously Presented) The information recording medium in accordance with claim 11, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that the reflectivity exceeds 5 %.

Application No.: 10/028,978

Docket No.: 21994-00036-US

15. (Previously Presented) The information recording medium in accordance with claim 10, wherein the recording layer is formed by a phase change material.

16. (Currently Amended) A reproducing apparatus for reproducing an information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda/NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and

wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens;

the reproducing apparatus comprising:

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling to ~~drive~~ driving of the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

demodulator means for demodulating an information signal read out by the pickup;

interface (I/F) means for transmitting a signal demodulated by the demodulator externally; and

controlling means for controlling the entire reproducing apparatus.

17. (Previously Presented) The reproducing apparatus in accordance with claim 16, the reproducing apparatus further comprising an auxiliary information demodulator for demodulating a differential signal outputted from the pickup.

Application No.: 10/028,978

Docket No.: 21994-00036-US

18. (Currently Amended) A recording apparatus for recording an original information signal on an information recording medium comprising:

- a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;
- a recording layer formed on the microscopic pattern; and
- a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda/NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and

wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens,

the recording apparatus comprising:

- a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from and recording on the information recording medium;
- a motor for rotating the information recording medium;
- servo means for controlling ~~to drive~~ driving of the pickup and the motor;
- a turntable for supporting the information recording medium while rotating;
- interface (I/F) means for receiving the original information signal to be recorded;
- modulator means for modulating the original information signal;
- waveform converter means for converting the original information signal into a format suitable for a recording characteristic of the recording layer of the information recording medium;
- auxiliary information demodulator means for demodulating a differential signal outputted from the pickup; and
- controlling means for controlling the entire recording apparatus.